

Model Entrance Test – B.Sc. Actuarial and Financial Mathematics

1. If $f(x) = x^2 - x$, then
 - a. $f(x + 1) = f(-x)$
 - b. $f(x + 1) = -f(x)$
 - c. $f(x + 1) = f(x - 1)$
 - d. $f(x + 1) = f(1 - x)$

2. If $f(x) = \log_a 1/x$ then $f(a^3) =$
 - a. 0
 - b. -3
 - c. 3
 - d. None of these

3. The inequality $4x - 3 \leq 2x + 5$ reduces to
 - a. $x \leq 4$
 - b. $x > 4$
 - c. $x \geq 3$
 - d. $x < 3$

4. What will be the compound interest on a principal of Rs. 1000 in 3 years when the rate of interest is 10% per annum?
 - a. 233
 - b. 331
 - c. 200
 - d. None of the these

5. If $f(x) = \frac{x^2 - 5x + 6}{x - 2}$ and $g(x) = x - 3$, then
 - a. $f = g$
 - b. $f \neq g$
 - c. $f = -g$
 - d. $g = -f$

6. The modulus of $\frac{i + 1}{(1 - i)}$ is
 - a. 3
 - b. 1
 - c. $\frac{1}{2}$
 - d. None of these

7. In a group of 260 students, 180 study mathematics and 120 study English. How many of them study both English and mathematics?
 - a. 80
 - b. 40
 - c. 20
 - d. 110

8. $\log\left(\frac{a}{b}\right) + \log\left(\frac{b}{c}\right) + \log\left(\frac{c}{a}\right) =$
- 4
 - 1
 - 0
 - None of these
9. The hypotenuse of a right angled triangle is 50cm and the sum of the other two sides is 8cm. Then the two unknown sides are
- 5cm and 9cm
 - 1cm and 7cm
 - 6cm and 2cm
 - 5cm and 3cm
10. If \vec{i} , \vec{j} , \vec{k} have the usual meaning in vectors, then $\vec{i} \cdot \vec{j} = \vec{j} \cdot \vec{k} = \vec{k} \cdot \vec{i} =$
- 1
 - 0
 - 1
 - 2
11. The right circular cylinder shown on the right has a circular base and a closed top. Its volume in terms of r and h is
- $2\pi r^2 + 2\pi r h$
 - $\pi r^2 + 2\pi r h$
 - $2\pi r h$
 - $\pi r^2 h$
12. If f is a function whose graph is the parabola sketched to the right, then $f(x) < 0$ whenever
- $x < 1$
 - $x > -3$
 - $-3 < x < 1$
 - $x < -3$ or $x > 1$
13. Since 4^6 approximately equals 4000, of the following, which best approximates 4^{12} ?
- 1600,000
 - 16000,000
 - 4000^{12}
 - 1600^2
14. The inequality $|2x - 1| \leq 3$ is equivalent to
- $2 \leq x \leq 3$
 - $-1 \leq x \leq 2$
 - $-1 \leq x \leq 3$
 - $x \leq 4$
15. Two coins are tossed simultaneously. The probability of at most one head is
- $\frac{1}{2}$
 - $\frac{1}{4}$
 - $\frac{3}{4}$

d. 0

16. The domain of $\frac{2x}{\sqrt{4-x}}$ is

- a. $[4, \infty)$
- b. $[-4, \infty)$
- c. $[-\infty, 4)$
- d. None of the above

17. $I + A + A^2 = (I + A)^{-1}$, then A^3

- a. $I + A$
- b. 0
- c. $I - A$
- d. None of the above

18. If $f(x) = 1 - x^2$, $g(x) = \sqrt{1+x}$, then $f(g(1)) =$

- a. $1/2$
- b. 2
- c. -1
- d. $\sqrt{2}$

19. If A and B are two matrices such that $AB = B$ and $BA = A$, then $A^2 + B^2 =$

- a. $2AB$
- b. $2BA$
- c. $A+B$
- d. $A-B$

20. $\tan^{-1}(1)$

- a. Not defined
- b. 0
- c. $\frac{\pi}{4}$
- d. None of these

21. If A and B are mutually exclusive events and $P(A) = 0.1$, $P(B) = 0.7$ then $P(A \cup B) =$

- a. Not defined
- b. 0.8
- c. 0.6
- d. None of these

22. $\lim_{x \rightarrow \pi} \frac{\sin x}{x} =$

- a. π
- b. 0
- c. 1
- d. ∞

23. If the derivative of a function is $3x^2 + 5x$ then the function is

- a. $6x + 5$
- b. $x^3 + 5x^2 - 5$
- c. $x^3 + 4x^2$
- d. None of these

24. $\int_1^4 f(x)dx$ represents the
- Area under f for $x < 4$
 - Area under f between 1 and 4
 - The antiderivative of f at 4
 - None of these
25. There are 3 English, 4 mathematics, 5 chemistry and 3 physics books on a bookshelf. If you have to select 4 books from the shelf, one from each subject, then the number of choices are
- 160
 - 90
 - 180
 - None of these
26. The area of the triangle with vertices at $(-4, 1)$, $(2,1)$, $(2,-3)$ is
- 14
 - 16
 - 12
 - None of these.
27. If a binary operation $*$ is defined as $a * b = 3a + 4ab - 3$, then $2 * 7 =$
- 59
 - 36
 - 0
 - 63
28. The function $f(x) = x^2 + 1$, $x \geq 1$ is
- Strictly increasing
 - Strictly decreasing
 - Constant
 - None of these
29. $\frac{\sin x}{\sin x - \cos x} + \frac{\cos x}{\sin x - \cos x} =$
- $\sin x$
 - $\cos x$
 - $\sin x - \cos x$
 - $\sin x + \cos x$
30. If you roll a pair of fair dice, then the probability that the sum of the dice is 4 is
- 0
 - $1/12$
 - $5/36$
 - $1/36$